INTERNATIONAL RICE COMMISSION

NEWS LETTER

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SPECIAL RICE MEETING

IN pursuance of the resolution of the 1951 FAO Conference on the urgent problem of rice supplies and its subsequent endorsement by the FAO Committee on Commodity Problems and the FAO Council, a Special Rice Meeting was finally convened, with due regard to the position of the International Rice Commission, in Bangkok, Thailand, from 5-16 January 1953, to make a study of the economic factors that affect the present and prospective supplies, distribution, and price of rice in the main producing and consuming areas. The Meeting was attended by delegations from Australia, Burma, Ceylon, Cuba, France, Germany, India, Indonesia, Italy, Japan, Korea, Laos, Netherlands, Pakistan, Philippine Republic, Portugal, Saudi Arabia, Spain, Thailand, United Kingdom, United States and Vietnam; and observers from ECAFE and the International Bank for Reconstruction and Development.

Among the recommendations of the Meeting, the following may be summarized for ready reference:

A. ECONOMIC INCENTIVES TO INCREASE RICE PRODUCTION

Concerning price policies, the Meeting recommended:

1. That all member governments operating price or related policies review those policies in the light of the considerations urged in the report, so as to ensure that the policies adopted are definitely encouraging production, and do not represent

a burden on the community incommensurate with the benefits derived from those policies.

2. That governments in reviewing their price policies collect more data on production costs showing their composition, rice market prices, the prices of producer and consumer goods, and that such information and the conclusions drawn from it be made avaiable, through FAO, to other interested member governments.

Concerning subsidies, the Meeting recommended:

3. That governments review their subsidy programs or plans for such programs in the light of the considerations urged in the report to determine if they could or should be improved.

Concerning agricultural credit, the Meeting recommended:

4. That governments should as fast as possible set up credit facilities or expand their present programs.

5. That FAO should consider the desirability of extending the study of agricultural financing, including agricultural credit, by seminars or other suitable means in the Far East region in cooperation with ECAFE and other international agencies concerned.

6. That FAO give high priority to requests from member governments for technical assistance in setting up national programs for agricultural credit.

Concerning cooperative organizations, the Meeting recommended:

7. That governments conduct or bring up-to-date studies to investigate a) the proportion which the producer now receives of the consumer rice prices; b) the marketing process with the object of determining which steps could be rendered more efficient and; c) improved methods of marketing administration.

8. That governments encourage the development and expansion of cooperative organizations to this end.

Concerning land tenure improvement, the Meeting recommended:

9. That member governments review their current tenancy regulations with the objective of making equitable provisions regarding minimum periods of lease; restrictions on ejectments by landowners; amount of rents; type and term of payment; machinery for enforcement or supervision and for the settlement of disputes.

10. That FAO give technical assistence to member goverments upon their request in investigating legal and other phases of land tenure.

11. That the results of any investigation at present being carried out by the FAO Secretariat into various aspects of land reform be made available to the member governments.

Concerning land settlement, the Meeting recommended:

12. That governments conduct surveys for the exploration of land suitable

for rice cultivation and develop plans for the settlement of farmers in those areas.

13. That FAO assist countries upon request in carrying out the above recommendation.

B. ECONOMIC METHODS OF IMPROVING DISTRIBUTION

Concerning organization for collection and distribution, the Meeting recommended:

14. That member countries continue to give constant and careful thought to the possibilities of improving their respective organizations for internal collection and distribution and for the handling of exports and imports.

15. That information relating to the methods of each organization be interchanged in order that all member countries may have the opportunity of deriving practical mutual benefit from the experience of others.

Concerning grading and standardization, the Meeting recommended:

16. That the member countries expedite the establishment of objective standards for grading paddy and rice.

17. That FAO be requested to assist interested countries by supplying information regarding types and sources of equipment which may be used to determine objectively different qualities and conditions of rice.

18. That FAO be requested to assist interested countries in the adoption and use of standard grades through the conduct of training centers on a national or international basis to provide instruction and demonstration in the techniques of grading and the operation of an effective grading service.

19. That a small panel of experts on rice grading be formed, under the auspies of FAO, who should explore the possibilities of an approach to uniform standard grades on an international level and report its suggestions to member governments for their further consideration.

Concerning inspection and quality control, the Meeting recommended:

20. That exporting and importing countries should concert such arrangements as may be mutually acceptable.

21. That inspection services should be made available at the principal assembly points within the commercial producing areas, in order that farmers may reap the benefits of quality production

22. That FAO be requested to assist interested governments in the training of qualified personnel for inspection work. Such assistance should be coordinated with training in rice grading and standardization.

Concerning storage and handling, the Meeting recommended:

23. That an analysis of the economics of different types of storage, such

as the relative costs of bag and bulk storage and of handling charges, of pest control, management and other expenses, should be undertaken by interested member governments.

24. That member governments may approach FAO for advice and assistance in their programs of storage development and personnel training.

25. That countries should consider seriously the establishment of market credit facilities for paddy or rice in storage as security, in order to help to eliminate seasonal fluctuations in price.

Concerning processing, the Meeting recommended:

26. That each country should undertake an economic study of rice milling with a view to its improvement.

27. That countries should make more efficient use of rice by-products

28. That countries should make studies of the effects of the decentralization of rice milling on food supplies and their economics.

29. That, in view of higher yield and nutritional quality, member governments should encourage the production of undermilled rice wherever possible.

30. That interested member governments be requested to extend the use of parboiled rice for its nutritional value and higher outturn of head rice.

31. That FAO be requested to assist member governments in matters of rice processing.

Concerning transport, the Meeting recommended:

32. That any long-term production plans should make adequate provision to increase internal transportation facilities in order to ensure a smooth flow of movements.

Concerning market intelligence, the Meeting recommended:

33. That rice market news services should be established in each member country, where they are not in existence, as an integral part of a broad market intelligence program.

34. That all rice importing and exporting member countries cooperate with FAO to the fullest extent in supplying information for compilation, analysis and distribution.

35. That, wherever practicable, countries should arrange for mutual exchange of rice market information.

C. OTHER RECOMMENDATIONS

Concerning production and use of subsidiary food crops, the Meeting recommended:

36. That FAO should assist member governments upon request in the exchange of seeds for experimental and demonstration purposes.

37. That member governments should develop suitable methods of processing alternative foods to make them more acceptable to rice eaters.

38. That member governments should encourage consumption of cereal foods other than rice through ex-

tensive nutritional education programs.

39. That FAO should assist member governments in developing these nutritional programs by giving technical assistance upon their requests.

Concerning fish culture, the Meeting recommended:

40. That countries should consider the possibility of introducing fish culture in rice fields with the assistance of FAO if necessary.

Concerning the Technical Assistance, the Meeting recommended:

41. That FAO be requested to provide, as soon as possible, reports on the practical results achieved from their Expanded Technical Assistance Program in terms of actual increase in production obtained, savings made through improved storage, processing and marketing facilities, and improvement secured in standards of nutrition.

Concerning international rice trade, the Meeting did not feel in a position to make any recommendations regarding the international trade in rice, or to suggest any over all plan or agreement for directing international trade.

Concerning future consultations on rice problems, the Meeting did not likewise feel in a position to suggest when a further meeting, like the present one, should be held, as much would depend upon the progress achieved by member governments in putting into operation the recommendations of the present meeting for increasing rice production and improving distribution.

RICE RESEARCH IN EAST BENGAL

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Agricultural Experimental Station, Dacca

East Bengal or East Pakistan has an area of about 54,000 square miles, or 33 million acres. Out of 25 million acres of cultivable land, 22.5 millions are now under cultivation and out of the cultivated area, 19.6 millions or 87 % is in rice. So rice is the major crop of the province and also the staple food of the people.

Rice can be grown anywhere in the province and it outyields any other grain crops. In fact, rice is grown throughout the year. According to the time of harvest, rice can be classified as Spring, Autumn and Winter varieties. The Spring and Autumn varieties are usually short seasoned, requiring 3-5 months for maturity and can be grown any time of the year. The Winter varieties are long seasoned and, while it

can be grown any time of the year, it matures only during October and November. So the Winter varieties have seasonal limitations.

Two crops of rice are generally obtained in most parts of the province. That is, one early maturity variety followed by a late variety. Rice is also grown in rotation with ju'e or legumes in many places.

Although rice is grown very extensively in the province, with an annual production in the order of 7.7 million tons, her food requirements fall short by 10% a year. But the population steadily increases, so the food situation in the province will become more serious as the time goes on. The solution lies in the increase of acre yield, which is comparatively very low at present.

In the province there is a large number of rice varieties grown by farmers every year. These varieties can be broadly classified into the following five categories:

1. *High Land Aus.* It is sown from April to May and harvested from August to September. It is usually broadcast with the early rains and, in some areas, transplanted and generally followed by a Winter crop of mustard, pulses, vegetables or root crops.
2. *Low Land Aus.* It is broadcast in low land from February to March and harvested from June to September.
3. *Deep Water Aman.* It is sown on low land from February to March and harvested from November to December when flood water has receded.
4. *Transplanted Aman.* It is transplanted on low land from July to August and harvested from November to December.
5. *Boro Paddy.* It is gown in seedbeds in November, transplanted on low land which does not dry up easily in the Winter and harvested during April and May.

Rice Research Organization. Rice research was started in Dacca as early as 1909 under an Economic Botanist, who was generally assisted by one Assistant Economic Botatist, three Botanical Assistants, one Mycological Assistant, one Entomological Assistant, one Statistical Assistant and a number of field assistants, together with an adequate secretarial staff. At first the research work was limited to the two major rice groups, namely: the Aus or Autumn paddy and the Transplanted Aman paddy. In 1921, the deep water Aman was added to the list for improvement.

After partition, East Bengal was left with only two experimental stations, one at Dacca and the other at Habiganj, under the control of one Economic Botanist (cereals), who is presently assisted by one Assistant Economic Botanist and a number of technical assistants.

Rice research work in East Bengal was under the supervision of Dr. Hector until 1932. It was during his time that most of the present improved varieties of rice were developed. He was succeeded

by Dr. S. Hedayetullah, the present Director of Agriculture, East Bengal. He helped to further improve the varieties and to popularize them among the farmers. At present, the writer is in charge of rice research work for the province.

Past accomplishments. To date a total of 59 improved varieties of rice has been recommended to the farmers of East Bengal for cultivation. These varieties differ in yield capacity as well as in grain quality. For instance, the Aus varieties have been selected for high yield and early maturity, in order to escape from early flood; the transplanted Aman varieties for high yield, grain qualities and resistance to lodging; the deep water Aman varieties for high yield and resistance to flood; and the Spring varieties for high yield, grain quality and earliness.

Among the several thousand varieties of rice grown by the farmers every year, the following are the pure-lines which were established and are maintained even today. The present improved varieties have been selected either from the pure-lines or from the hybrid materials.

Highland Aus	931 strains	(classified)
Highland Aus	150 ,,	(unclassified)
Low Land Aus	31 ,,	(unclassified)
Transplanted Aman	857 ,,	(classified)
Transplanted Aman	381 ,,	(unclassified)
Deep Water Aman	804 ,,	(unclassified)
Boro Paddy	514 ,,	(unclassified)

About 100 strains of foreign paddies are also maintained.

The cultural experiments, like dates of planting, number of seedlings per hole, age of seedlings, weeding, etc. have been carried out and definite results have been obtained.

The effects of green manure on the paddy yield has been determined.

All superior varieties evolved by selection and otherwise have been tried in district demonstration farms and conclusions have been drawn on the basis of these trials as to their suitability.

Present research work. Because of the shortage of staff, no elaborate program of rice research is presently attempted, except to maintain the pure-lines and the varieties already established and to carry out a limited amount of improvement work along the following lines:

1. *Maintaining pure-lines.* The pure-lines are being maintained very carefully. The number of pure-lines being very large, they are grown in three year's rotation. The seeds are preserved in desicators for three years before they are sown.
2. *Selection.* Further selections are made from year to year from the pure-lines, but preliminary tests indicate they

are not in any way superior to the ones already selected.

3. *Hybridization.* New hybrids seem to be very promising and are being produced for resistance to diseases, insects and flood.

4. *Foreign introduction.* One of the most successful varieties in the transplanted Aman group is a foreign introduction. At present a large number of varieties collected from America, China, Indonesia, Iraq and Thailad have been grown for the last few years, but none of them have proved to be of any value to East Bengal. From this year collections from Japan and Egypt will be placed under trials.

5. *Cultural practices.* The effect of double cropping on the yield of both the first and second crops are studied. The effect of uprooting deep water paddies at different stages of growth on the yield, and the effect of the continuous cultivation of the same variety on the same field year after year on grain qualities are also under observation.

6. *Manurial experiments.* All kinds of paddies show some response to ammonium sulphate. But to manure (like oil cake, cowdung, bone meal, etc.) they respond differently. For the transplanted Aman paddy and the Boro paddy, the response is not appreciable, while the response of the Aus paddy is marked.

Present problems. The improved varieties so far have not covered 15% of the total acreage in rice. In fact, these varieties have not been thoroughly tested in different parts of the province. So it is difficult to make definite recommendations for certain areas. Today there is not a single variety that can be recommended for saline tracts of East Bengal which amount to 5 or 6 million acres in rice. The crops in this area suffer very badly and most frequently.

There is also a need for breeding strains resistant to Ufra, a nematode disease, and stemborers. These two maladies cause a considerable loss to the rice crops in the province, A start has just been made to breed resistant types against Ufra. But much more intensive work is needed in order to get any results.

Pakistan is the third largest rice growing country in the world, after China and India. But most of her rice crops is grown in East Bengal. The future improvement in rice production in the province lies in the increase of acre yield and not in the expansion of acreage. Such factors, like the improvement of seeds, cultural practices, application of manure and fertilizers, control of pests and diseases, facilities for irrigation and the education of farmers, should be tackled properly. At present these factors are taken by the various sections of the Department of Agriculture on a limited scale and not in a coordinated way.

Japan, with 7 million acres in rice, has over 40 experimental stations. Madras in India, with about the same acreage in rice, has 11 experimental stations.

But East Bengal, with nearly 20 million acres in rice, has only 2 stations and the inadequacy is very evident. Now there is a proposal to the government to establish a rice research institute and five more experimental stations in order to cope with the situation and to bring about prosperity to the country.

PROGRESS REPORT ON THE INTERNATIONAL RICE HYBRIDIZATION PROJECT

Dr. N. Parthasanathy, Director

Central Rice Research Institute, Cuttack, India

The International Rice Hybridization Project was launched at the Central Rice Research Institute at Cuttack, Orissa, India in August 1952, with Burma, Ceylon, India, Indonesia, Japan, Pakistan, Philippines, Thailand, United Kingdom and Vietnam participating in it. This project is jointly financed by the FAO and the participating member countries.

Eight *japonica* types of rice were procured from Japan and thirty three *indica* types from the remaining nine countries. Including some special requests for new combinations by Malaya and Indonesia, a total of 270 crosses were programmed to be made. The seeds of the first filial generation (F1) were to be grown at the Institute and the harvested seeds to be sent to the respective countries for raising the second hybrid generation (F2) for selection of types suitable to their own soil and climatic conditions.

During 1951–52, sufficient seeds of 28 F1 cross combinations along with seeds of 64 others were sent to Burma, Ceylon, Indonesia, Malaya, Philippines, Thailand, Vietnam and certain States of India. Adequate quantities of F1 seeds for growing F2 generatiin of 169 cross combinations, other than the 28 F1s already despatched in 1951–52, along with seeds of 52 combinations are ready for despatch during March 1953, to all the nine participating countries. Out of the remaining 73 cross combinations, i.e., 270 – (169 plus 28), crossed seeds for 41 combinations have already been collected. Crossed seeds for 32 more combinations are to be produced during March–June 1953. In the 1953 season, the F1 seeds of the above 73 cross combinations will be grown and the harvested seeds will be despatched to the respective countries.

Since the inception of the project, 224, 167 pollinations were made and 26, 843 crossed seeds collected.

In some of the cross combinations with over 50% seed sterility in the F1 plants, back–crosses to their respective *indica* parents were made in an effort to increase fertility. 67 such back–crosses

were attempted, out of which six did not yield any seeds at all. Several others gave very poor setting. 21, 699 pollinations were made and 1,125 backcrossed seeds collected, securing a low setting percentage of 5.2. The backcross progeny will be grown during the 1953 season and the harvested seeds will be sent to member countries for further selection. Fresh backcrosses will be made during the 1953 season.

At the last meeting of the Working Party on Rice Breeding, held at Bandung in April 1952, it was decided to obtain an additional number of *indica* types from different countries for hybridization with *japonias* to increase the chances of getting fertile combination. In this connection, 63 more *indica* types were received from seven countries, namely, Burma, Philippines, Thailand, Indonesia, Vietnam, Malaya & Pakistan. These are programmed to be crossed to two *japonica* types (Fukoku and Zuiho) specially obtained through the courtesy of Dr. T. Morinaga from Japan. These *japonica* varieties are known to give a high degree of fertility when crossed to *indica* types. In this connection, it may be mentioned that it would facilitate the progress of the project if the participating countries would send to this Institute notes on the behaviour of the hybrid material grown in their respective countries. A special request is being sent to all the countries concerned.

In accordance with the recommendation of the last meeting of the Working Party on Rice Breeding, a Cytogeneticist with a laboratory attendant has been appointed to investigate the causes of sterility in interracial crosses of rice and to trace their conseqences in breeding, as well as to devise suitable techniques for increasing the fertiliry of cross combinations. Selected F1 hybrids with different degrees of sterility will be grown and the meiosis in these will be studied in detail. The degree of cytological crossover in these hybrids will be estimated. The tetraploids of the F1 seedlings are to be produced and their utility in raising the fertility of the cross combinations by suitable breeding methods is to be investigated.

February 27, 1953

BRIEF REPORT FROM THAILAND ON THE JAPONICA-INDICA CROSSES GROWN IN 1952

Dr. H.H. Love

Thailand is one of the countries that is cooperating in the FAO-sponsored rice improvement program. This program is concerned with crossing some of the better varieties selected by each participating country with certain japonica types. This project was developed at the Rangoon meeting of the International

Rice Commission held in February 1950. Later it was decided that the crossing work should be located at one station and the Central Rice Research Institute at Cuttack, India was selected as headquarters. In 1950 four Thai varieties were sent to Dr. Ramiah, at that time Director of the station at Cuttack. These varieties were used in making a number of crosses with japonica types. In all, eight different japonica types were used. In accordance with the original agreement, the first-generation plants were grown at the Cuttack station. A total of 15 crosses were made and seed from the first-generation plants was sent to us in 1952 to grow the second generation. In all, about 60,000 seed were received.

Past experience with some japonica types had indicated that this type of rice apparently grows better in northern Thailand than in the Central Plain, so it was decided to divide the seed, sending a larger portion to San Patong near Chiengmai, while the remainder was grown at Bangkhen. Naturally, as would be expected, some of the seed failed to germinate, but in general a good crop was obtained at San Patong and while the plants did not grow so well at Bangkhen we were still able to harvest a large number of plants for further testing. In order that we can make the best possible study and use of this material it was decided to harvest all the plants that produced any amount of seed. Altogether, we expect to have somewhere between 30 and 40 thousand plants for testing in 1953. A certain amount of sterility was found, as was to be expected. Yet with the crosses we have apparently sterility will not be present to any great extent and will not seriously affect this work.

Plans are now being made to grow this material this coming season and a large planting will be made at San Patong but other plantings will be made at Bangkhen, Rangsit, and perhaps one or two other places, the seed from one plant to be used to plant one row or one small plot. Since the second generation is the segregation generation we know that many of the plants selected will continue to segregate in the third generation. Some will no doubt be homozygous, at least for certain characters concerned with yield. Those that appear to be homozygous and promising from the standpoint of production and quality will be selected for further tests in 1954. We would also expect that a large number of good plants will be found in the rows where segregation is occurring. Many of these will be selected for further study in 1954.

If the season is satisfactory we hope to have a large amount of this material available in the field at the time of the meeting of the Working Party on Rice Breeding this coming September.

March 10, 1953

NEGLECTED ASPECTS OF RICE STORAGE

Mr. S.S. Easter

FAO Grain Storage Specialist

Rice storage study has been sadly neglected. Even today it is not receiving the attention it deserves. Some of the basic considerations of storage problems are often overlooked. For instance, there is a tendency to treat the storage problem as an isolated one which can be solved by an entomologist, an economist, an engineer or other specialists trained in a narrow field. Actually it is a complex problem which requires the knowledge of all these specialists for its solution.

It is common to think of storage damage in terms of losses due to the eating of insects and rodents or the spoilage by heating due to the growth of fungi and bacteria. These subjects have been discussed in many other publications and will not be repeated here. However, attention will be drawn to some of them in the course of discussion.

Insects cause a lowering of grain quality indicated in trade circles as "weevilly" in addition to the physical loss by eating. A good illustration is the attack of certain beetles on legumes, where conspicuous exit holes seriously lower the value of the crop in market. Another example is the attack of an Indian meal moth on seed wheat, where the germ is destroyed, leaving plump kernels useless for seed. In some countries the presence of insects, insect fragments and insect excrement above certain tolerances, renders the milled rice, flour or other food material unfit for human consumption.

Another serious indirect loss is caused by insects, initiating heating in some small spots or pockets in grain which otherwise is cool and dry enough for safe storage. The insects have living processes the same as other living organisms. Heat and moisture are released as end products of metabolism. Both of these products provide the necessary conditions for the growth of fungi which in turn produce more heat. This stimulates the insect growth so there is an auto-acceleration of both, resulting in a serious damage to the grain.

Rodents also cause indirect losses which are usually far greater than the actual amount of grain eaten. In wooden bins, holes may be cut in the floor, walls, or roof to permit spillage or the entrance of rain, both of which may result in heavy losses. The presence of rodents always results in contamination of the grain by urine, feces and hairs, all of which lower the quality. Where grain is stored in bags, the rodents cut the bags to get the material for nesting and to reach the grain. The result is the damage to the bags and the loss of labour in repairing and, in some cases, refilling them. Mice are particularly bad in this respect.

It is possible to have both insects and rodents under control, so that losses

from these sources are prevented. Where the storage facilities are inadequate, the control measures are more expensive than where the storage facilities are adequate. In long range planning, the savings in the cost of pest control alone over a period of years may be a big percentage of the cost of constructing an improved storage. An extreme example is seen in two cities in Central America. In one city, grain is stored in bags in a conventional warehouse and must be fumigated in a chamber at least three times a year and at a cost of $3.99 per ton per year. In the other city, a few miles away, grain is stored in bulk in steel tanks at a cost of less than $0.10 per ton per year. On the basis of twenty years or more, this difference in cost of insect control alone would pay for adequate storage facilities.

Handling must be considered as an integral part of any overall storage program. Dependable engineering data are generally lacking on the cost of unit operations in most of the underdeveloped countries. This is particularly true with regard to unit costs of operation in grain handling. Probably, the major reason for the lack of such engineering studies has been the prevalence of cheap labour. However, labour costs are increasing so that there is now a growing incentive for the reduction of handling costs. Mechnical handling of bulk grains is the cheapest method. Mechanical equipment is made or can be made to fit local needs from small farms to large grain storage terminals. With mechanical equipment, much time can be saved in loading or unloading.

In under-developed countries when proposals are made for improved grain storage facilities, the usual answer is that the country being poor cannot afford expensive silos or bulk bins. Here again is an error due to the lack of engineering data, but while handling costs are difficult to calculate, the cost of storage can be determined easily. Again, there is a tendency to look at the costs on a year to year basis rather than over a period of twenty years or more. If the latter is used in a storage cost analysis, it will be readily seen that where bags are the storage unit, they are actually more costly than steel or concrete. In addition the improved storage facilities whether of steel, concrete, wood or other material will have many added advantages, such as reduced handling costs and reduced losses from pests, or pest control.

It should become evident that all these interrelated factors must be considered jointly by various competent specialists before any attempt is made to improve the storage. Of course, no projects should be initated that are not based on local conditions. A corn storage in a temperate country can not be used as a rice storage in a tropical country.

A NATIONAL TRAINING CENTERIN THAILAND

In line with the recommendation of the Third Session of the International Rice Commission, held in Bandung 1952, the government of Thailand is now holding a National Training Center for the Grading and Inspection of Rice and the Economics of Rice Storage Operations in Bangkhen, with the assistance of the FAO. The Center opened on March 2, 1953 and will last for 8 weeks, with 18 hours for class work and 15 hours for laboratory practice each week. Participants are divided into two sections of about 30 persons each. While Section A is attending lectures, Section B will be engaged in laboratory work and vice versa.

The following subjects are included in the course of instruction:

A. Grading and Inspection of Paddy and Rice

1. Identification of principal commercial varieties of paddy.
2. Importance of Standard Grades.
3. Moisture determinations and how to operate various moisture testers.
4. Methods of taking a representative sample and use of sampling equipment.
5. Practice in sampling actual shipments of rice.
6. Laboratory analysis and grade determination of the samples taken.
7. Introduction of new objective standards for grading paddy and rice,
8. Testing paddy for milling quality.
9. Emphasis shall be placed on the grading of various qualities of milled rice, during the first half of the course, and then on the grading and standardization of various types of paddy during the latter half.

B. Storage Technology

1. Insects: what they are, how they live, develop and spread.
2. Insect control through: (a) good management: (b) fumigation; and (c) other methods,
3. Heating: causes, extent, and means of control.
4. Rodents and their control.
5. Drying of paddy: natural and artificial, with principles involved. A Hess drier will be demonstrated.
6. Methods of storing paddy and rice.
7. Handing of paddy and rice: mechanical versus manual — demonstrated.

C. Storage Management and Administration

1. Efficiency in the assembly and distribution of paddy and rice.
2. Economic importance of rice grading and inspection.
3. Need for management controls and what they can accomplish.
4. Rules for establishment of proper management controls with re-

ference to receiving, weighing, drying, space allocation, handling, disbursing, etc.

5. Demonstration of management controls applicable to paddy storage, drying and milling.

D. Paddy Storage Loan Program

1. Explanation of what it is and its benefits to the producer, buyer, miller, and the overall economy of the country.
2. Factors most important in the successful operation of a storage loan program.
3. Control records and accounting required.
4. Demonstration of how physical paddy storage and credit features of a loan program and should be coodinated.

E. Marketing and Pricing of Paddy and Rice

1. Marketing objections.
2. Marketing systems compared and main problems confronting the rice industry.
3. Methods of improving the efficiency of marketing.
4. Relation of harvesting practices to quality and price of rice.
5. Prices; seasonal variation; comparison of world prices of different qualities.
6. Significance of a speedy and accurate market information service.
7. Safeguarding a proper system of weights and measures.
8. Government organisation for efficient collection and marketing of paddy and rice.
9. Market legislation needed to improve present conditions.
10. The role of cooperative marketing.

NOTE ON THE THIRD SHORT COURSE FOR TRAINING AGRICULTURAL PERSONNEL FOR THAILAND

Dr. H.H. Love

The third short course for training men in some of the principles of plant breeding, genetics, soils, statistics and field plot technique was held from January 19 to February 25, 1953. The general purpose and organization of this course was described in the International Rice Commission NEWS LETTER issued by the IRC Secretariat, No. 2, June 16, 1952. This year, in addition to lectures and demonstrations in genetics, plant breeding, statistics, soils, field plot technique, and disease and insect control, some special topics were presented by guest lecturers. Some of the topics were: meteorology, grain classification and storage, fish cul-

ture for paddy fields, the botanical classification of rice, poultry investigations, upland crops, and horticulture. While the main emphasis had to do with rice improvement and use of fertilizers it was felt desirable that an occasional lecture in other subjects would be useful to acquaint the members with different lines of work and fields of study.

The course held this year was divided into two parts. The first two weeks was given for men who had not attended either of the previous short courses. For the later part a large number who had attended either one or both of the previous courses were called in. In addition, a number of the men who had been in attendance the first two weeks also continued through the course. The value of this training will mean much to the agricultural program in Thailand, especially in the fields of rice improvement and use of fertilizers. These men learn how to handle regional variety trials and regional fertilizer tests. In these variety trials a number of different varieties are compared for yield and other characteristics and in the fertilizer test a number of different fertilizer combinations are used. For both tests the plots are randomized and these men are trained to set up a randomized experiment and then they follow through with the planting, cultivation, and harvesting. The majority of these experiments are well handled and in this way it is possible to obtain a great deal of valuable data which otherwise would be impossible to obtain. It is planned that later in the season we will ask a number of these men who are participating in this experimental work to join together for a brief refresher course at Bangkhen and then take trips to see a number of these experiments in different parts of the Kingdom. This was done in 1951 and those who participated felt that they obtained a great deal of value from this opportunity. So as part of our short course training we plan to make such trips at least every other year, if they cannot be made every year

It is our experience that the men attending these courses are eager to become more familiar with the principles and methods of agricultural research and to equip themselves so that they can participate in a satisfactory manner in this valuable work.

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